

WHAT IS CLAIMED IS:

1. A method for forming a gate oxide film of a semiconductor device comprising the steps of;

5 forming a gate oxide film and a polysilicon film sequentially on a semiconductor substrate;

performing a nitrogen ion implantation process for the semiconductor substrate including the gate oxide film and the polysilicon film;

10 performing a thermal treatment process to form barrier layers by combination of oxides and nitrogen at an interface between the semiconductor substrate and the gate oxide film, and at an interface between the gate oxide film and the polysilicon film; and

forming a nitride film on the polysilicon film.

15 2. The method of forming a gate oxide film of a semiconductor according to claim 1, wherein the thermal treatment process is performed by an RTP spark annealing process.

20 3. The method of forming a gate oxide film of a semiconductor according to claim 1, wherein the nitrogen ion implantation process is performed by using a source gas including N^+ or N_2^+ , with a dose of $1E14atoms/cm^2$ to $1E16atoms/cm^2$ and an implantation energy of 1keV to 20keV.

4. The method of forming a gate oxide film of a semiconductor according to claim 2, wherein the RTP spark annealing process is performed at

an N₂ gas ambient, a ramp up temperature is about 100°C/sec, and the RTP temperature is 900°C to 1100°C.